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PROBLEMS IN ANIMAL HEALTH ASSOCIATED WITH MINERAL IMBALANCE IN GRAZING HERBAGE*

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During the past 30 years there has accumulated a voluminous literature on the effects of mineral imbalance in pasture grass on the health and productivity of grazing stock. In general, the conditions recorded cause losses rather through unthriftiness and chronic disease than through acute disturbance and death. Investigations in Ireland have shown that similar syndromes of a chronic nature in grazing animals are often associated with pasturage imbalanced as to its inorganic content. In the time at my disposal this afternoon I propose to review briefly some aspects of investigation of these syndromes which include aphosphorosis, conditioned copper deficiency, cobalt pine and selenium toxicity.

APHOSPHOROSIS

The condition "bog lame" or "bog crook" has been known for many generations in different parts of Ireland under a variety of names such as "bockynamona," "bris brón," "crippen," "galar crupagh" or "luanach." Its incidence has been and is particularly high on much of the permanent grazing land of the carboniferous limestone plain which extends over the midland counties of Ireland. "Bog lame" is prevalent on low-lying badly drained moors as well as on poorer upland pastures. The soil of the moors is often underlain with heavy deposits of calcareous marl —a large percentage of which is pure calcium carbonate. The associated pasturage is of poor quality, consisting mainly of sedges, mosses and poorer grasses such as Yorkshire fog and crested dogstail with abundance of weeds like plantains, scabious, daisies and black knapweed. Wild white clover, although stunted, persists in the pasture especially if the vegetation has been closely grazed. Better grass species such as timothy, perennial ryegrass or the meadow grasses are insignificant in the sward.

Symptoms of "bog lame" include pica, unthriftiness, stiffness, lameness and, in advanced cases, progressively increasing anorexia and emaciation. Lactating cows are always more severely affected than other cattle. The incidence is seasonal in that the condition makes its appearance during the summer months when cattle are maintained entirely on pasture. The first symptoms on a farm usually occur within two months of the herd going out on grass. Initially, only one or two animals are affected, and although there may be other cases later, it is unusual for many members of the herd to be affected simultaneously. Symptoms invariably disappear during the winter, some time after the animals have been fed grain or concentrates, but may reappear during the following summer when the herd has been at pasture for a month or more. On farms in which "bog lame" occurs milk yields are low and invariably there is a history of infertility in some of the cows and heifers. Cows have been known to pass several years without producing a calf. Store cattle on these farms make poor growth and often appear stunted.

Up to some 25 years ago the condition was thought to be a manifestation of rheumatism and was commonly treated (without effect) with salicylates and other medicaments, but following the findings of Theiler and his associates on aphosphorosis, a new approach to the aetiology of "bog lame" was considered and veterinary surgeons practising in Ireland began to realise that mineral deficiency was involved. At first the deficient element was not generally recognised. It was usually thought to be calcium. Animals were treated "shot gun" fashion with a mixture of calcium carbonate, dicalcium phosphate and sodium chloride with small amounts of some salts of "trace elements" added.

In 1936, Colonel A. G. Doherty (1944), a former Chief Veterinary Officer of Kenya, recognised "bog lame" as being clinically similar to aphosphorosis as it occurred in parts of Africa. He treated the condition successfully in a herd of Shorthorn cows in Co. Kildare by the feeding of phosphates. Clinical symptoms disappeared after a few weeks of phosphate feeding, only to reappear some three weeks after supplementation had been stopped. Later, Sheehy *et al.* (1948) found that "bog lame" occurred in cattle which were confined to pastures of low phosphate status, and showed in a series of trials that phosphate feeding was specific in the cure of the condition. Determinations (carried out on a large scale) of minerals in the blood of grazing animals and in the herbage from appropriate pastures confirmed Doherty's observation that "bog lame" was chronic aphosphorosis and demonstrated the existence in Ireland of a latent or early malnutritional form of the disturbance (O'Moore, 1950a).

The early stages of aphosphorosis are latent. There are no symptoms other than loss of condition and low productivity in growth, milk and fertility, but even in this early subclinical form aphosphorosis may be detected by blood analysis (Theiler, Green & Du Toit, 1927). The phosphorus content of grazing herbage is often just sufficient to prevent the appearance of obvious signs of disease but yet is insufficient to maintain an animal in health and production. In these circumstances the deficiency remains latent and an animal so affected is merely an unproductive encumbrance to its owner. Should there be a sudden drop in the already low phosphate level of such herbage—as, for example, is the case during a period of drought—the decrease of body phosphorus becomes further exaggerated, especially in lactating cows, and symptoms of "bog lame" soon become evident. The earliest clinical manifestation of aphosphorosis is a depraved appetite. In order to satisfy the need for the mineral, cattle instinctively lick walls and chew stones, wood, leather, rags and available material of all types. In this way choking, traumatic reticulitis, and lead poisoning are common hazards on "bog lame" farms. As the disease progresses there is

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marked loss of appetite, creaking of joints during movement and stiffness, often followed by lameness. This is the stage of the disease known as "bog lame." Cattle are inclined to walk on their heels and as a result the hooves grow long and may be turned up. When standing the hind legs are usually drawn under the body so that the back is arched. Later an animal may become so stiff that it remains recumbent all day, making feeble attempts to graze in this position; if forced to rise it exhibits pain. Should the progress of the disease not be arrested by the supplying of phosphates, emaciation will become apparent and an animal in this condition is invariably disposed of at a total loss to the farmer.

Chronic "bog lame" is easily recognised by its symptoms and its response to dosing with phosphates. From the economic point of view, the latent or early malnutritional form is more insidious as an animal so affected may be regarded merely as a "bad-doer" and thus specific treatment is not attempted. For many years the annual loss to Irish agriculture from low milk yields, fewer calves and poor growth in store cattle due to latent aphosphorosis must have reached considerable proportions.

Pasture Studies.—As already stated, the flora of "bog lame" pastures consist of species of poor quality. Chemical analysis has shown that the herbage is invariably of low nutritive value. On a dry weight basis crude protein levels of "bog lame" vegetation are of the order of 9 per cent. during active growth as compared with 18 to 20 per cent. in the case of vegetation at the same stage of growth from adjacent reasonably good permanent pasture. The phosphate content of "bog lame" pasture grass is always $<0{\cdot}15$ per cent. (as P) while that of grass from good permanent pasture is $>0{\cdot}24$ per cent. (as P). Herbage calcium levels vary widely on both "bog lame" grazings and on grazings on which the condition does not occur; if considered apart from phosphorus the herbage calcium level is not a factor in the incidence of aphosphorosis. However, as will be discussed later when calcium is reviewed in terms of the Ca/P ratio, it becomes of greater significance. Table I provides analytical data for typical "bog lame" grazings.

TABLE I

MINERAL CONTENT OF HERBAGE IN RELATION TO THE INCIDENCE OF APHOSPHOROSIS

	Percentage composition on D.M.			
	Calcium	Phosphorus	Ca/P ratio	Geological formation
Farm 1	0·70	0·12	5·8	Limestone
„ 2	0·71	0·10	7·0	„
„ 3	0·70	0·09	8·7	„
„ 4	0·40	0·11	3·6	Granite
„ 5	0·38	0·10	3·8	„
„ 6	0·34	0·12	2·8	„

Blood Studies.—Under veld or range conditions many workers have found that estimations of blood inorganic phosphorus are useful in the detection of latent aphosphorosis. In Ireland—where cattle are housed in the winter and fed a variety of foodstuffs while during the summer they are changed periodically from field to field—blood analysis has limited application only. It was established by Theiler, Green and Du Toit (1927) that in dietary phosphorus deficiency the blood inorganic phosphorus level fell long before symptoms of aphosphorosis became evident. It has been found in Ireland (O'Moore, 1950b) that exactly the opposite takes place when extra phosphate is supplied over a period to a "bog lame" cow, *i.e.*, the blood inorganic phosphorus rises and remains within normal limits long before clinical symptoms disappear. The rise to normal of the blood inorganic phosphorus usually occurs within 7 to 10 days after the commencement of phosphate feeding while it invariably requires six or seven weeks of such supplementation, before symptoms of "bog lame" abate. From this it may be stated that while an analytical finding of low blood inorganic phosphorus in the absence of endocrine dysfunction is indicative of aphosphorosis, the finding of a normal level cannot in every case be accepted as a confirmation of a sufficiency of body phosphate. This finding is of practical importance in that it shows a limitation in the use of blood inorganic phosphorus determinations as a means of diagnosing aphosphorosis, or of differentiating unthriftiness or anoestrus due to a deficiency of dietary phosphorus from similar conditions due to other causes. Under Irish farming conditions, blood analysis has been found useful in the detection of latent aphosphorosis in cows which have been maintained entirely on the same pasture for a month or more. Blood inorganic phosphorus levels of the order of 2·0 mg. per cent. can be correlated with pasture grass contents of from 0·30 to 1·20 per cent. calcium (as Ca) and $<0{\cdot}15$ per cent. phosphorus (as P). Serum calcium levels of cows grazing on "bog lame" pastures are not abnormal; these range from 9·5 to 11·0 mg. per cent. and are related neither to the blood inorganic phosphorus level, to the pasture calcium content nor to the incidence of "bog lame."

An Animal's Requirements for Phosphorus.—A sufficiency of phosphorus in the diet is essential for the growth and metabolism of the animal body. In association with calcium and to a lesser extent with magnesium, it supplies the mineral content and compactness to the bones and thus rigidity to the skeleton. It is also involved in many of the physiological processes which are essential to life. Much of the assimilated phosphorus is stored in the bones from whence it may be drawn when the daily intake is insufficient to meet the body's requirements. During lactation there is a considerable drain on this phosphate reserve as each gallon of milk secreted by the cow removes several grammes of phosphorus from the body. Groenewald (1935) has shown that even in extreme cases of dietary deficiency of phosphorus the amount of the mineral excreted in any given quantity of milk remains constant. If the daily mineral requirements of a cow are not balanced by at least an equal intake of minerals from the herbage the animal has to depend on its skeletal reserves. Normally during lactation a cow draws on its skeletal reserves and rapidly stores minerals during the dry period so as to make good the deficits of lactation. If, as will be shown later, the intake of phosphorus from the herbage is so low that the body phosphate reserves are rapidly depleted, symptoms of "bog lame" soon become evident. Lactating cows require more phosphorus for their physiological requirements than do other bovines, and are always the chief sufferers on phosphate-deficient pasture. Dry cows rarely show such pronounced symptoms.

The daily requirements of calcium and phosphorus for the lactating cow include an amount of each mineral for maintenance and a further amount for the production of milk. For the efficient utilisation of calcium and phosphorus not only must there be a sufficiency of each element in the diet, there must also be a correct ratio of one to the other. As expressed in terms of Ca : P, this is usually considered to be about 2 : 1. However, if there is adequacy of phosphorus in the diet, this ratio becomes of lesser importance (Theiler, Du Toit & Malan, 1937). In addition to a dietary sufficiency of calcium and phosphorus, adequate vitamin D, either in the ration or else elaborated by exposure of the

animals to sunshine, is a necessary factor in rendering the minerals available. The incidence of aphosphorosis in Ireland is at its height during the months of maximum sunshine, *i.e.*, from June to August, and due to the feeding of grain, at its lowest when animals are housed. It is assumed that possible sub-optimal elaboration of vitamin D is not to any marked degree a factor in the occurrence of " bog lame."

A sub-committee on dairy cattle nutrition (National Research Council, U.S.A., 1950) has computed the daily calcium and phosphorus requirements of cows as follows :—

	Calcium grammes	Phosphorus grammes
Dry cow weighing 1,000 lb.	10	10
Lactating cow weighing 1,000 lb. producing 1 gallon of milk	20	17
Lactating cow weighing 1,000 lb. producing 2 gallons of milk	30	24
Lactating cow weighing 1,000 lb. producing 3 gallons of milk	40	31

The Ca/P ratios range from 1·6 to 1·0 : 1.

It is controversial as to whether the mineral intakes prescribed in the above standards are, in fact, adequate for milch cows. The point need not be debated in this paper. It is merely intended that the tables as set out should serve as a comparison between a cow's mineral requirements as computed by animal nutritionists and its daily mineral intake if confined to a " bog lame " grazing.

Although wide variations exist in the calcium and phosphorus contents of those species of grasses which are eaten and those which are rejected by stock (Godden, 1926), it has been shown by Du Toit, Luow and Malan (1940) that an approximation of the daily mineral intake of a grazing animal may be arrived at by analysing representative samples of those species of grasses which the animal eats. It is emphasised that the herbage samples must be representative and that the resulting analytical data will provide an approximation only of an animal's mineral intake.

Assuming that a lactating cow of Shorthorn type consumes an arbitrary amount of 12 kg. of dry grass per day, the intake of each mineral as supplied by herbage of different mineral content is as follows :—

Calcium		Phosphorus	
Percentage calcium in herbage (D.M.)	Calcium intake grammes	Percentage phosphorus in herbage (D.M.)	Phosphorus intake grammes
0·25	30	0·10	12
0·30	36	0·15	18
0·35	42	0·20	24
0·40	48	0·25	30
0·45	54	0·30	36
0·50	60	0·35	42

These figures show that provided the pasture is satisfactory in respect of protein and calories, 12 kg. of dry grass of 0·34 per cent. Ca and 0·26 per cent. P will supply the daily requirements of a 3-gallon cow. Theiler and Green (1932) considered that dry matter levels of 0·42 per cent. Ca and 0·26 per cent. P in otherwise satisfactory pasture were sufficient for dairy cows, while Mitchell (1947) recommended the percentage composition of dry feed necessary for a 4-gallon cow as 0·27 per cent. Ca and 0·26 per cent. P.

Now, consider the case of a cow of Shorthorn type producing 2 gallons of milk per day. According to the computations of the committee on dairy cattle nutrition, such a cow requires a daily intake of 30 grammes of calcium and 24 grammes of phosphorus. From the above table it will be seen that a daily intake of 12 kg. of dry grass of 0·25 per cent. Ca and 0·20 per cent. P will only just supply the requirements for maintenance plus 2 gallons of milk. Reference to the analytical data in Table I shows that, again assuming a daily intake of 12 kg. of dry grass, the herbage in every case contains considerably more calcium than is required to meet the daily needs of a 2-gallon cow but yet contains only about half the amount of phosphorus required for the same purpose.

Blood studies in Ireland (O'Moore, 1950b) have shown that lactating cows when pastured on herbage of $<0{\cdot}15$ per cent. P content soon become depleted of their phosphate reserves. Blood inorganic phosphorus levels fall from a normal of about 5·0 mg. per cent. to below the critical figure of 3·0 mg. per cent. As anorexia, which is always a feature of aphosphorosis, becomes greater there results an even smaller intake of the already meagre supply of herbage phosphate. While the conservation of body phosphorus is aided by a reduced output of milk, in some of the animals the deficiency has advanced to such proportions that symptoms of " bog lame " become evident. The deficiency is easily corrected by the supply of extra dietary phosphorus either as a daily supplement to the grazing cattle or else by a change of pasture, when recovery follows in upwards of six weeks.

In addition to an absolute deficiency of phosphorus, it has been found that the wide Ca/P ratio which occurs in some pastures has a further adverse effect. Generally, the incidence of " bog lame " is higher and the symptoms much more severe on marl soils than on acid soils of granite regions in which the herbage phosphate is quite as deficient but the Ca/P ratio narrower. It will be seen from Table I that the Ca/P ratios for herbage of three limestone farms range from 5·8 to 8·7 : 1 as compared with 2·8 to 3·6 : 1 for that of three granite farms. The analytical figures presented for Farms 1 to 3 are typical of many of those investigated on the marl soils of carboniferous limestone plain while the figures for Farms 4 to 6 are representative of grazings in the granite regions of the West or North-West of Ireland. These findings are essentially in agreement with those of earlier workers (Theiler, 1931 ; Theiler, Du Toit & Malan, 1937), who reported that in dietary phosphorus deficiency, a wide Ca/P ratio in the diet either hastened the onset of clinical symptoms of aphosphorosis or further aggravated the condition if symptoms were already present. It would seem that on the marl soils of parts of the Irish Midlands a gross excess of calcium may be nearly as important a factor in the severity of the symptoms of " bog lame " as is a deficiency of phosphorus. Hignett (1950) has referred to the possible dangers of overliming in relation to infertility. There are grounds for suspecting that in one farm under investigation, a heavy application of ground limestone to alkaline soil may have been a factor in the subsequent occurrence of " bog lame " in the grazing stock. According to the farmer, none of his animals had previously shown evidence of pica or stiffness although on occasion it had been found difficult to get the cows in calf. About two months after an application of 4 tons of ground limestone per acre to a portion of his pasture land some of the cows developed symptoms of " bog lame," while determinations of blood inorganic phosphorus detected latent aphosphorosis in other cows and heifers. The average mineral content of herbage

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samples from the dressed fields was : calcium 1·0 per cent. and phosphorus 0·18 per cent. (Ca/P ratio 5·5 : 1).

Anoestrus in Relation to Aphosphorosis.—Marked inhibition of the oestral cycle associated with phosphorus-deficient pastures has been reported from many parts of the world. Theiler and Green (1932) suggested that this might be due to a low plane of nutrition on naturally poor grazings and not primarily to a depressed intake of phosphorus. Du Toit *et al.* (1934) observed that anorexia, which was always a feature in dietary phosphorus deficiency, by reducing the intake of essential nutrients including phosphorus, might be the primary factor in anoestrus on low-phosphate grazings. They drew attention to the low protein content which was associated with low phosphate in the herbage. In metabolism experiments, Morris and Ray (1939) showed that a low dietary intake of phosphorus was associated with poor utilisation of protein in the body. As already stated, the protein contents of herbage samples from "bog lame" grazings were markedly low.

A controlled experiment in Ireland showed that extra protein when fed over a period in the form of a high protein/low phosphorus supplement to anoestrous, hypophosphataemic cows on phosphate-low grazing failed to bring about a recurrence of oestrus. On the other hand, cows which were pastured on the same grazings and which had been anoestrous from three to five months, came in oestrum when fed disodium phosphate daily over periods ranging from 10 to 35 days. It is unlikely that reappearance of oestrus resulted from an increased intake of other pasture nutrients due to the influence of phosphate feeding on the appetite. The pasturage of "bog lame" farms is of poor quality both as to floral species and to chemical composition, and even a much improved consumption of such herbage over the comparatively short period of from 10 to 35 days could not possibly affect metabolism sufficiently to restore the oestral cycle. It may be that the cows were able to utilise to better advantage what little extra protein they consumed.

Copper Deficiency or Hypocuprosis

Symptoms similar to those described by Jamieson and Allcroft (1950) as being due to conditioned copper deficiency have been observed in pastured cattle in different parts of the country. The condition is associated with unthriftiness, stunted growth and rough depigmented coats, those of naturally red animals appearing a faded yellow. The incidence is higher in young cattle than in mature stock. Scouring may or may not be present ; faecal egg counts show that helminthiasis is an added burden in a proportion of copper-deficient animals which scour. Blood analysis reveals low levels of copper (*i.e.*, 0·2 to 0·6 mg. per litre) in some of the animals but this is by no means a constant finding. Haemoglobin levels and blood cell counts are not indicative of anaemia. Copper dosage has been found specific in treatment although in some cases it has elicited relatively slow response. On occasion, blood analysis has confirmed that hypocuprosis and aphosphorosis may co-exist in the one animal. In such cases there occur symptoms of aphosphorosis in varying degree in association with depigmented coats.

In investigations to date, the incidence of conditioned copper deficiency in Ireland invariably has been associated with pasturage of high calcium status and often of wide Ca/P ratio. While samples of dried herbage contained normal levels of copper (*i.e.*, over 7 p.p.m.), the molybdenum levels varied from 7 to 22 p.p.m., this being moderately in excess of the accepted normal for pasture grass, which ranges from 1 to 3 p.p.m. In two farms under investigation the incidence of hypocuprosis was greater on those pastures which were dressed with basic slag. It seems reasonable to assume that an increased dietary intake of molybdenum was at least partly responsible as (i) on certain soils slag has a stimulating effect on the absorption of molybdenum by vegetation, and (ii) samples of slag have been found to contain molybdenum to the extent of a few p.p.m. This finding raises many interesting points in the treatment of pasture and is under investigation at the present time by the soil and veterinary research laboratories.

Table II provides analytical figures for mixed herbage from several typical grazings on which conditioned copper deficiency has been confirmed in stock. No. 1 consists of good pasture containing nutritious grasses and a high percentage of clover. Numbers 2 and 3 are semi-moor grazings in which the herbage is of poorer quality. Conditioned copper deficiency and aphosphorosis co-existed in cattle on Farm No. 3. "Normal Farm" consists of very good permanent pasture.

Table II

Mineral Content of Herbage in Relation to the Incidence of Hypocuprosis

	Percentage composition on D.M.			p.p.m. on D.M.		
	Calcium	Phosphorus	Ca/P ratio	Copper	Molybdenum	Cu/Mo ratio
Farm 1	1·20	0·30	4·0	16·0	9·5	1·6
" 2	0·80	0·16	5·0	8·5	8·0	1·0
" 3	0·75	0·12	6·2	11·0	13·5	0·8
"Normal Farm"	0·72	0·30	2·4	12·0	1·5	8·0

Cobalt Deficiency

Cobalt deficiency in grazing ruminants occurs in different parts of Ireland—notably on tracts of land in the granite regions of the Western and North-Western counties and in the O.R.S. formations of Kerry. "Pine" is also associated with soils which are impregnated with calcareous sea sand —that is, sand which has been deposited by wind action or which has been applied year after year to coastal pastures as a dressing. There is a seasonal variation in the uptake of cobalt by herbage from the soil. July is the month of minimum uptake and this corresponds with the period of the year of severest pining, *i.e.*, during late summer and autumn. Species of herbage vary in ability to absorb cobalt from the soil ; uptake is greater by clovers than by grasses such as timothy or cocksfoot, while flying bent absorbs cobalt in relatively large amounts.

The characteristic picture of cobalt deficiency is one of starvation. It is often difficult to distinguish between a deficiency of cobalt and malnutrition due to low intake of calories and protein—however, in some areas of Galway and Kerry cobalt deficiency occurs on relatively good pastures where there is an abundance of feed for stock. Sheep and to a lesser extent cattle which are confined to such pastures soon become listless and debilitated. The animals practically stop grazing and marked anaemia develops, haemoglobin levels falling to 6·0 g. per cent. and below. In some occurrences in cattle pica has been observed but in uncomplicated cobalt deficiency there is no stiffness or lameness as may occur in aphosphorosis. Animals on cobalt-low pastures are very susceptible to helminthiasis.

There is a link with an interesting history between phosphorus and cobalt deficiencies in cattle as occurring in adjacent areas of Connemara. On the coast of the Galway mainland cows which are pastured on the rough upland grazings may develop a rheumatoid condition known locally as bris bròn. Blood and herbage analysis has confirmed

that this is an aphosphorosis of a somewhat milder form than is met with in the Irish midlands. It is indicative of the difference in an animal's requirements for phosphorus that the excellent strongboned Connemara pony thrives on the very pastures where aphosphorosis is in evidence in the cows. It has been common knowledge among the local people for many years that a "bris bròn" cow if changed for a period from mainland pastures to that on one of the small coastal islands will soon recover from stiffness and put on condition.

An entirely different nutritional problem occurs in stock on these inshore islands. Cattle which are pastured for any length of time on some of the holdings develop symptoms of "pine." The condition, which is known locally as "galar truagha," has been found to be directly due to extremely low cobalt status of the grazings while parasitic infestation is probably a contributory factor. Tradition has long had it that affected cattle if transferred from these island pastures to the rough upland grazings of the Galway mainland recover within a few weeks. In fact, the prophylactic value of the mainland grazings as a measure against the occurrence of "galar truagha" is recognised by the island stock-owners. It has long been customary for them to drive their cattle across the strands at low tide to the mainland; the animals are then left on the rougher grazings for some weeks before returning to the island. Many of the small holders on the islands are in the habit of exchanging, for periods annually, some of their cattle for an equivalent number of "bris bròn" animals belonging to a mainland farmer, this temporary exchange proving profitable to both individuals.

Reference to Table III will show that while the herbage phosphate levels of mainland grazings are low, *i.e.*, of the order of 0·14 per cent. P, those of the island grazings are decidedly high, *i.e.*, >0·32 per cent. P. On the other hand, dried samples of island herbage contained only 0·03 p.p.m. of cobalt as compared with 0·20 p.p.m. and over for mainland herbage. The soil of the islands is highly alkaline (*p*H ca. 7·8) and is very heavily impregnated with blown calcareous sand. Under such conditions there is little availability of cobalt to the herbage. These island soil features are essentially similar to those of areas in the Outer Hebrides (Boddie, 1947).

Table III

Mineral Content of Herbage in Relation to the Incidence of Cobalt Pine

	Percentage of composition on D.M.		p.p.m. on D.M.
	Calcium	Phosphorus	Cobalt
Island Farm 1	1·0	0·35	0·04
" 2	1·2	0·32	0·03
" 3	0·95	0·37	0·03
Mainland grazing 1 (curative)	0·42	0·15	0·30
" " 2 (")	0·35	0·14	0·20

Selenium Toxicity

For some generations a chronic disease of horses and cattle has been recognised in a localised area of Co. Limerick. Occurrences are only in animals which have been maintained over a period on certain pastures within the area. The most obvious symptom in both horses and cattle is abnormality in growth of hoof; even in the early stages local blacksmiths can recognise a horse which has grazed in these fields by altered texture of the horn. If a horse is confined for some time on "affected" pastures rings appear below the coronary band while later one or more of the hooves may separate at the coronet when a new hoof commences to grow; it takes over three months of such grazing before the old hoof is shed. In time such a horse becomes very lame and does not move willingly; due to the pain caused by laminitis it prefers to remain recumbent for most of the day. In the course of the disease much of the hair is lost from mane and tail. Affected cattle are unthrifty and poor of coat; there is malformation with a ringed appearance of one or more of the hooves, loss of hair and occasionally sloughing of part or all of the tail. Movement is stiff and, due to the pain in the feet, an affected bovine often grazes on its "knees." Cases also occur in horses and cattle which have been wintered on hay harvested from "affected" fields. Symptoms are arrested by alteration in diet—either withdrawing the "affected" hay from the ration or, in grazing animals, by a change of pasture. Local farmers consider that the ploughing-up and reseeding of "affected" fields results in an increased severity of symptoms in animals during the following grazing season.

Data obtained from analyses of a variety of constituents in blood herbage and soil, carried out jointly at the Veterinary Research and the Soil Laboratories, presented no abnormal features. In view of the resemblance of the symptoms to those of chronic selenium toxicity (alkali disease), as reported from Wyoming and elsewhere, Walsh *et al.* (1951), at the Soil Laboratory, determined the selenium contents of soil and herbage from "affected" and from adjacent "non-affected" fields. The figures which these workers obtained for samples of mixed herbage are given in Table IV, *viz.*, 150 to 500 p.p.m. in the case of mixed herbage from affected fields and only 1 p.p.m. in that from adjacent non-affected fields.

Table IV

Selenium Content of Herbage

(analyses carried out at the Soil Laboratory, Department of Agriculture)

	P.p.m. on D.M.
Mixed herbage from "affected" farms	150–500
" " " "normal" adjacent farms ...	1

It has been known for many years in the U.S.A. that selenium is absorbed by vegetation when in a soluble organic form only; inorganic selenium is relatively insoluble and is not absorbed by grasses in more than trace amounts. However, Beath, Draize and Gilbert (1934) have shown that certain vetches (*Astragalus* spp.) are capable of absorbing inorganic selenium and converting it to an organic form which is returned to the soil as such as these plants die and decay. The soluble organic selenium is then readily available to many species of pasture grasses. Plants which absorb inorganic selenium are termed "indicators." Examination of swards in Co. Limerick has not revealed any unusual plant species likely to be an "indicator." In view of the opinion of local farmers that ploughing-up and reseeding worsens the condition in grazing stock, it may be that a relatively common grass absorbs inorganic selenium from the soil and later returns it as an organic complex which is readily available to other grass species. This problem is under investigation at the present time.

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Discussion

Mr. Parker, in opening the discussion, thanked Dr. O'Moore for an extremely interesting and illuminating paper. He was glad that some of the Erse names for diseases, which looked so romantic, had been translated into English.

He could not pass without comment the incredible story of Connemara, where cattle on the mainland affected with aphosphorosis were swopped with cattle on the nearby islands affected with cobalt deficiency, with mutual advantage.

Mr. Parker expressed his interest in the story of selenium poisoning, but did not comment further as he had no experience or knowledge of this trouble.

Aphosphorosis, on the other hand, had occurred in the West Midlands of England, particularly on thin, high-lying soil. Lameness was not observed but the cattle in question were of the Hereford breed, and Dr. O'Moore associated bog lameness with the better milking stock.

Unthriftiness and pica, including bone-chewing, had been observed and improvement was facilitated by the use of minerals, including phosphate. Mr. Parker was very interested in Dr. O'Moore's finding that the use of phosphate supplements to the food would quickly raise the phosphorus level of the blood, though the alleviation of clinical aphosphorosis would be delayed for some time. While holding in the greatest respect the ability of chemists to estimate with reliability elements that were present in animal and plant tissues only in parts per million, we needed to be careful not to try to estimate disease as a matter of percentage. This danger was apparent not only in relation to phosphorus but also in estimating copper. The farms where copper deficiency had been observed in the stock in the West Midlands did not coincide with a phosphate deficiency, but there were certain factors of importance in relation to analyses. Calves never showed hypocupraemia, but on the farm particularly investigated it was the habit to sell bull calves for slaughter. Liver estimations for copper on these calves always proved to be low.

Again, it was observed on a neighbouring farm that the blood copper could sink just as low towards the end of the grazing season, but whereas the first farm was entirely on peat, only the grazing land was on peat on the second farm and apart from an occasional bout of scouring at the end of the grazing season, no ill effects were observed on this second farm. There was some suggestion that low copper, whether estimated on blood or liver, might be associated with a low fertility rate in cattle. This, however, was still under investigation.

In passing, it was worth mentioning that on some of the farms in Somerset where teart pastures occurred, hypocuprosis was also discovered in the cattle. The two conditions, however, were apparently independent. Dr. O'Moore had referred to the small range of variation in blood calcium analyses. This was a point of considerable importance. Samples of blood were often sent to laboratories with a statement that mineral deficiency was suspected and a request for analysis for calcium amongst other elements. It could not be overstressed that blood analysis for calcium was only of use in estimating metabolic upsets of the milk fever type and was in no way concerned with investigating possible mineral deficiencies.

Mr. Parker referred to the vague unthriftiness which occurred in parts of Warwickshire in cattle and said that the careful work described by Dr. O'Moore was a stimulus to be less complacent about these vague conditions which still await explanation.

Professor Evans asked what was done to treat cattle with sloughing of the feet caused by selenium poisoning and if, as selenium was similar to sulphur, it replaced the sulphur in the horn of the hoof.

Dr. O'Moore replied that the owners changed the affected animals to other pastures and that selenium substituted for sulphur as suggested.

Professor Evans pointed out that in considering the function of copper in the body it should be remembered that it was present in both the blood and the liver as a protein.

Mr. J. C. Buxton asked if the essayist had encountered infertility associated with an imbalanced calcium-phosphorus ratio in the diet. He emphasised that the important point was the availability of the minerals in the body and enquired if this was affected by enzyme secretion ; he also stressed that one mineral affected the availability of another. With regard to the association of heavy pasture liming and infertility, Mr. Buxton asked if the heavy liming could make available an excess of molybdenum, which would cause a low blood copper, which in turn might be the cause of infertility. He had also found goitre and iodine deficiency in sheep a serious problem in the East Midlands, and said that if the pregnant ewes were fed on kale during their whole pregnancy a high percentage of the lambs would develop goitre. He wondered if the kale contained a goitreogenic factor which upset the enzyme.

Dr. O'Moore suggested that the questioner was referring to infertility associated with a sub-optimal phosphorus and an excess calcium intake ; the investigations in Ireland were with cows grazing on pastures which were grossly deficient in phosphate, but which often contained abundant calcium. He agreed that heavy applications of lime to certain soils rendered molybdenum more available to the herbage and that soils associated with hypocuprosis in grazing stock and excess molybdenum in the pasturage, ranged from *p*H 6·5 to 7·8. As he had already stated, in two farms under investigation hypocuprosis in grazing stock had followed the application of slag containing 4·75 p.p.m. of molybdenum. Although goitre did occur in Ireland it was not a serious problem.

Professor E. G. White observed that although the theory that a calcium-phosphorus imbalance caused infertility had received a lot of publicity, it had not been proved.

Mr. I. B. Munro, speaking about the determination of the calcium and phosphorus requirements of cattle on grass, said that experiments had been carried out recently, on the University of Nottingham farm, on the conversion value of certain pastures for milk production. The preliminary results showed that the utilisation of a known amount of grass for milk production varied greatly in individual cows, and he considered that this variation in the ability of animals in food conversion should also be taken into account in assessing quantities of calcium and phosphorus obtained from grass.

Mr. E. T. Rees Evans asked about the incidence of milk fever in Ireland, Dr. O'Moore replying that it occurred but was not a serious problem.

Mr. J. G. Robertson enquired at what age symptoms of "bog lameness" appeared. Dr. O'Moore replied that it was mainly seen in lactating cows and was rarely encountered in calves and bullocks.

Mr. J. S. Steward asked for further details of the goitre caused by kale feeding. Mr. J. C. Buxton replied that it was a hyperthyroidism, and that, particularly in experimental cases, the thyroid glands were greatly enlarged.

Mr. R. I. Davies asked how aphosphorosis caused lameness, and Dr. O'Moore replied that it was difficult for him to say. In an advanced stage the lesion was that of osteomalacia.

In answer to a question by Mr. R. M. Loosemore, Dr. O'Moore said that no similar symptoms had been observed in horses or pigs.

Weekly Wisdom

In every man's mind, some images, words and facts remain, without effort on his part to imprint them, which others forget, and afterwards these illustrate to him important laws. All our progress is an unfolding, like the vegetable bud. You have first an instinct, then an opinion, then a knowledge, as the plant has root, bud and fruit. Trust the instinct to the end, though you can render no reason. It is vain to hurry it. By trusting it to the end, it shall ripen into truth, and you shall know why you believe.—Ralph Waldo Emerson (Essay on "Intellect").

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In a case when T. G. Davies, of Tanycwn Farm, Rhos, Swansea, was fined £250 for illegal slaughter of 27 beasts, 14 calves and two sheep, the inspectors reported that when they visited the farm they found an open-sided barn half-filled to the roof with closely packed hay which proved to be a cleverly made slaughterhouse.

THE VETERINARY RECORD
August 16, 1952

FOOT-AND-MOUTH DISEASE

I.—Enquiry into its Control

THE appointment by the Minister of Agriculture of a Committee to enquire into our present methods of control of foot-and-mouth disease is an inevitable result of the great public interest in this disease which has been aroused by the recent prolonged epizootic.

Whilst the general feeling within the profession is solidly behind the Minister in his continuance of the present slaughter policy it is natural that anxiety about its continuance has intensified during recent months. The reasons for this anxiety arise largely through the inherent objection aroused within a Briton to the slaughter of any animal on grounds that leave the slightest doubt as to their soundness. In this particular instance there are several doubts which weigh heavily with the ordinary man. Firstly, it is appreciated by many that the disease does not normally carry high mortality and that the majority of animals recover with fairly mild symptomatic treatment. Secondly, it is well known and often advanced by interested parties that a scheme of vaccination against the disease has been evolved in many countries where the disease is indigenous. Thirdly, it is claimed that these methods of vaccination achieve successful results and that, when speedily applied, they can be used effectively to check the spread of the disease. Fourthly, there seems room for improvement in the means employed to give both the general public and to a lesser extent the veterinary profession as much information as is possible about foot-and-mouth disease, the research being made upon it and its control. The occasional statements from Ministry or other quarters which are available to the public do not stem their anxiety over the slaughter policy, particularly when it is appreciated that the adherents of treatment or of vaccination—often supported by organs of the popular Press—are persistent in their efforts to get the slaughter policy changed.

Much can be written about the real justification for the policy of slaughter : it has a firm basis on economic grounds ; it minimises losses of meat and milk arising from the disease and achieves control with comparatively small cost both in terms of money and in terms of animals. This is evidenced clearly from a comparison of the figures of losses arising from the outbreaks in various countries on the Continent and in Great Britain.

The B.V.A. welcomes the enquiry by the Committee under the Chairmanship of Sir Ernest Gowers into the present policy for the control of foot-and-mouth disease as it believes that this is a unique opportunity for getting a sound review of the results following upon the outbreaks of this disease in many countries and the diverse means adopted for its control as well as the cost of combating the disease in various countries of the world. If the Committee has the time to go into this question properly and can write an authoritative and popularly intelligible report it will not only benefit the farming community and public at large but it will also make available to the veterinary profession much more information which the practitioners especially, with their busy life and comparative isolation from easy access to scientific publications and meetings, have long desired to obtain in a digestible form. This information will not only make them more personally satisfied but it will probably enable them to be more effective ambassadors for the policy adopted by the Government.

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II.—F.A.O.'s " International Plan "

An F.A.O. despatch from Rome, reproduced in our Notes and News columns, announces that a meeting of European countries will be convened " to implement an international plan to end the current outbreak of foot-and-mouth disease in Western Europe and to deal rapidly with future outbreaks "; also, that F.A.O. will suggest to participating countries the adoption of a " new, inexpensive method of vaccine production " which, utilising the tongues of freshly slaughtered healthy animals as a medium for culture of the virus, dispenses with the need for a group of live animals to act as hosts for the virus. It is estimated that this change of method could effect a saving of 90 per cent. of production costs. F.A.O. advocates that stores of the three main types of virus, A, O and C, be maintained in all countries which are able to manufacture vaccine ; also the storage of sufficient vaccine in one or more countries to meet the threat of an outbreak in any country in Western Europe : " a kind of mutual insurance system," rendered the more practicable by the reduction in cost of the new method of virus production.

This pronouncement, which has been widely publicised in the popular Press, may well revive the controversy concerning " slaughter or vaccination " as the correct policy for this country. It is advisable, therefore, again to remind critics of the slaughter policy of a few salient facts. Foot-and-mouth disease is not enzootic in Great Britain. The total of 550 outbreaks and a compensation bill of approximately £2,500,000 since the start of this series in November, 1951, to the time of writing, grievous though these are, are small in comparison with the outbreaks and losses sustained in those countries where a policy of isolation and vaccination is practised. Since the publication in May of our last reference to the general position in this country *vis-à-vis* that which obtains on the Continent, the outbreaks in France have increased in number, though fewer have occurred on the Belgian border and the Channel coast. This tendency for the disease to move South-West in France coincided with the diminution of the occurrence of initial outbreaks in the South of England. There have been no new initial outbreaks in Britain since the end of June, but the situation in France remains so serious that the possibility of further invasion continues.

The current outbreak on the Continent illustrates the perils of dealing with the disease in the absence of a slaughter policy. While there were 116 outbreaks in Britain last year, 20,000 occurred in Holland, 10,000 in France, 50,000 in Belgium and 155,000 in Western Germany. There has been a steady decline in the last-mentioned area from the peak month of November, when there were over 45,000 outbreaks. In France the disease continues to spread and all records were broken by the occurrence of over 61,000 outbreaks in the month of June, 1952. No official figures are yet available to show the extent of the losses in Europe caused by the current epizootic, but Dr. Ramon, Director of the International Office of Epizootics (*The Daily Telegraph*, July 15th, 1952), estimates that in France losses amounting to scores of millions of pounds have been caused by the disease through the death and deterioration of cattle and the falling off in production. If the losses in Germany are proportionate to the number of outbreaks, they too must be colossal.

We have in previous editions stressed the impossibility of maintaining our normal freedom from endemic foot-and-mouth disease if the policy of slaughter was substituted by that of vaccination. Notwithstanding the value of a number of vaccines, their use in Great Britain is impracticable and fraught with danger. It may serve a good purpose if we recapitulate the main considerations. (1) The impossibility of vaccinating a sufficient number of animals in a sufficiently short period of time. It takes a fortnight to produce immunity.

(2) That, as is indicated in the F.A.O. announcement, the type variants now go far beyond the well-documented A, O and C : *e.g.*, a particularly virulent A5 is mentioned. (3) It would be impossible to "hold in stock" enough of the various vaccines to meet all contingencies. (4) It seems that, roughly every decade, a virus particularly difficult to control appears. This is probably due to the fact that the viruses not only mutate, but there tends to be a temporary increase in invasiveness, and there is every probability that the mutation will go beyond the known range. (5) The duration of immunity is short, a matter of a few months only, necessitating frequent re-vaccination.

These facts and comparison of the current outbreaks at home and in Europe indicate clearly that any deviation from present policy would invite disaster. The news that in this country the outbreak has passed its peak and is now receding, and that the "stand-still" regulations have been revoked is substantial evidence of another triumph for the slaughter policy. It is also a great triumph for the veterinary staff of the Ministry of Agriculture. They have shown good administrative ability, vision, diligence and resource and Britain owes them a great debt.

ARTIFICIAL INSEMINATION OF LIVESTOCK IN SCOTLAND

Reconstituted Advisory Committee

The Secretary of State has reconstituted the Supervisory Committee on Artificial Insemination which was set up in 1943 to advise on the promotion and control of artificial insemination of livestock in Scotland.

The new Committee, which will be known as the Advisory Committee on Artificial Insemination, has been appointed for a period of three years, and its members are as follows:—

Appointed by the Secretary of State—Mr. W. J. Wright (Chairman); nominated by the Animal Breeding Research Organisation (Agricultural Research Council)—Dr. H. P. Donald; nominated by British Veterinary Association—Mr. H. M. Wilson; nominated by Edinburgh University (Veterinary School)—Dr. A. Robertson; nominated by Glasgow University (Veterinary School)—Professor W. L. Weipers; nominated by the National Farmers' Union of Scotland—Mr. R. C. M. Maitland and Mr. A. R. Semple; nominated by the Royal Highland and Agricultural Society of Scotland—Mr. W. J. Kilpatrick and Captain Ian S. Robertson; nominated by the Dumfriesshire Cattle Breeders' Association—Mr. A. Hector; nominated by Aberdeen and District Milk Marketing Board—Mr. J. Shand; nominated by Scottish Milk Marketing Board—Mr. W. Young.

The Committee has power to co-opt two additional members.

The following have been appointed assessors to the Committee: Mr. D. S. Barbour, Deputy Chief Veterinary Officer, Ministry of Agriculture and Fisheries; and Mr. A. J. Bean, Deputy Chief Inspector (livestock), Department of Agriculture for Scotland.

The Secretary of the Committee is Mr. W. A. Harbinson, Department of Agriculture for Scotland, St. Andrew's House, Edinburgh, 1.

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THE BRITISH ASSOCIATION

The annual meeting of the British Association for the Advancement of Science will be held this year in Belfast from September 3rd to 10th. At the inaugural meeting Professor A. V. Hill will deliver his presidential address on "The Ethical Dilemma of Science."

* * * * *

"The absence of cloven-hooved animals from the shows has not, however, been all loss. Attendances have not been greatly affected. There has been, for the time being, a resurgence of interest in the Clydesdale, and it has been generally conceded that not for a number of years has quality been so high at so many shows. The horse can certainly do with a boost when one glances at the preliminary results of the June census conducted by the Department of Agriculture, and notes that agricultural horses in the past year have declined by an estimated 7,000."—*Scottish Farmer.*

CLINICAL COMMUNICATION

CAESAREAN SECTION IN THE EWE

A CASE REPORT

G. H. ARTHUR,
Department of Surgery and Obstetrics,
Royal Veterinary College, Streatley

Records of maternal recoveries following the caesarean operation in sheep are sufficiently rare to justify the presentation of the following case history.

Subject.—A four-tooth Radnor ewe in good bodily condition.

History.—First-stage labour was present at 12 noon and when, at 2.30 p.m., it was seen that the ewe had not lambed, the farmer made a vaginal examination and found the "head back" and the ewe to be "very small in the pelvis." Veterinary aid was sought at once.

Examination.—At 3.30 p.m. the ewe was standing and straining heavily. The small size of the pelvis was confirmed and there was a large living lamb in anterior presentation with deviation of the head to its right side and complete retention of the right forelimb.

Procedure.—The right forelimb was extended easily but attempts to apply a "Benesch" head snare were successful only after the induction of epidural anaesthesia by injecting 5 c.c. "Tutocain" at the sacro-coccygeal junction. Traction was then applied to the head and forelimbs, but no progress was made, and it soon became clear that there was too great a disparity in the diameters of the foetus and pelvic inlet to allow vaginal delivery, despite the now normal presentation. Embryotomy was indicated, but the smallness of the maternal pelvis inclined one against intra-vaginal manipulation. Furthermore, suitable embryotomy instruments were not to hand, and as the foetus was still alive, caesarean section was decided on. Unfortunately, owing to lack of help, the operation could not be started until two hours later, by which time the lamb was dead.

Operation.—Epidural anaesthesia was induced by injecting 20 c.c. of "Tutocain" into the sacro-coccygeal space. The ewe was turned on to her back and the lower left abdomen clipped free of wool, washed with soap and water and dressed with spirit. Although there was satisfactory relaxation of the abdominal wall, anaesthesia of the skin was not quite complete, so that a subcutaneous injection of 5 c.c. of anaesthetic solution was made along the proposed line of incision. This extended from immediately in front of the udder forwards for 7 inches in a direction parallel with, and 2 inches lateral to, the left mammary vein.

Opening the abdomen and uterus presented no difficulty, but some manipulation was required to extract the lamb, and owing to the tension on the uterine wound, it became extended backwards for a further 3 inches.

Placental separation had occurred, and the membranes were removed easily. The uterus was closed with a continuous Lembert suture of No. 1 silk, and the peritoneum and abdominal muscles in one layer with interrupted sutures of the same material. A little sulphanilamide powder was now applied to the wound before repair of the skin with mattress sutures.

The large male foetus, which weighed 14 lb., was by a Suffolk ram.

Post-operative course.—Next day the ewe was bright and active. It drank a gallon of water and showed occasional

ABSTRACTS

Use of Phenothiazine Against Nematode Parasites of Cattle*

The incidence of *Bunostomum phlebotomum* in dairy calves in the coastal regions of Queensland is very high and this species causes serious retardation of growth and development of calves and frequent deaths due to the effects of these hookworms alone or to their association with *Haemonchus contortus*. In beef calves, however, heavy infestations with hookworms are rare (cf., Roberts, 1951, *Austr. Vet. J.*, **27**, 274).

Riek summarises the literature on the use of phenothiazine against various species of intestinal nematodes and records his own experiments with it. He used 77 calves aged 5 to 14 months running under field conditions, their maximum weight being 334 lb. A watery suspension of phenothiazine was given at dose-rates of 0·1, 0·2 and 0·3 g. per lb. bodyweight, either by flank puncture directly into the rumen or by the mouth as a drench. The animals were not starved before dosing. Weekly faecal examinations were done for three weeks before dosing and for four weeks after it. Tables record the average number of eggs per gramme found in each group of calves. The calves were infected with *B. phlebotomum*, *H. contortus*, species of *Ostertagia*, *Trichostrongylus* and *Cooperia* and *Oesophagostomum* (*Bosicola*) *radiatum*. At a dose-rate of 0·1 g. per lb. bodyweight, irrespective of the mode of administration, phenothiazine was highly effective only against *H. contortus* and was only partially effective against *O. radiatum*. In some calves it has a temporary effect only on species of *Trichostrongylus*, *Cooperia* and *B. phlebotomum*. At a dose-rate of 0·2 g. per lb. bodyweight, given by flank puncture, it reduced, with the exception of one calf, the egg-counts of *H. contortus*, *Trichostrongylus* and *O. radiatum* to negligible numbers, but was only partially and temporarily effective against *B. phlebotomum* and *Cooperia*, although there was in some calves a good and lasting effect on *B. phlebotomum*.

Repetition of the dose after four weeks gave better results, but this had little effect on *Ostertagia* and *Cooperia*. Administration of this dose by the mouth had similar effects. At a dose-rate of 0·3 g. per lb. bodyweight phenothiazine was given by flank puncture only and it was not more effective than at the rate of 0·2 g. per lb. bodyweight. To three calves phenothiazine was given at the rate of 0·1 g. per lb. bodyweight by abomasal puncture, but this did not remove heavy infections with *B. phlebotomum*.

Thus phenothiazine was not effective for the control of *B. phlebotomum* at dose-rates up to 0·3 g. per lb. bodyweight and there was little difference between its effects when it was given by the mouth or by flank puncture directly into the rumen. At the higher dose-rates used, some of the calves suffered from staggering gait and corneal opacities which caused temporary or, in some instances, permanent blindness due to corneal ulceration. These toxic effects are described.

G. L.

* **Use of Phenothiazine against Nematode Parasites of Cattle.** Riek, R. F. (1951.) *Austr. Vet. J.* **27.** 197.

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Estimation of Calcium in Bovine Blood*

The author differentiates between two fractions of bovine blood calcium on the basis of a sodium fluoride precipitation. This is determined by the addition of 3 and 4 mg. sodium fluoride, respectively, per 1 ml. of plasma. The mean figure of the differences between the total calcium and that amount remaining in each dilution is classified "free" calcium whilst the amount remaining in solution is regarded as "bound" and physiologically inert. The former, physiologically active, varies in amount for the same reasons that determine the total calcium content, *e.g.*, parturition, nutrition, ketosis and milk fever. The latter varies widely in normal animals. This, the author concludes, renders the total calcium figure of less significant value to the clinician than a "free" calcium determination which calls for no more technique than is demanded by a routine calcium estimation. In order to obtain maximum results, estimations should be made as soon as possible after taking the sample.

Results of certain limited experiments indicate that the "free" calcium content ranged from 5·2 to 6·4 mg. per 100 ml. blood for normal stall-fed cattle. On the other hand, these figures were reduced in the case of ketosis to less than 5·0 mg. per 100 ml. and in milk fever to less than 4·0 mg. per 100 ml. Normal cattle grazing spring grass, however, whilst they showed a slightly lower "free" calcium level than in the case of stall-fed cattle, showed a higher total calcium (due to an increase in the bound calcium fraction). Limited observations also showed a progressive fall in "free" calcium in normal cattle preceding parturition. This fall was arrested at parturition to be followed by a sharp rise. At this stage, too, inert calcium fell to be almost non-existent for a brief period. The generally recognised fall in total calcium at parturition is thus contributed to by both factors.

W. T. R.

* **Fractionation of the Calcium in Bovine Blood by Fluoride Precipitation.** Craige, A. H., Jun. (1952.) *Amer. J. vet. Res.* **13.** 31-37.

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Virus of Enzootic Abortion in Ewes: A Psittacosis Group Relationship*

Agent of enzootic abortion was prepared from growth in yolk sac of fertile eggs, partially purified by differential centrifugation and heated at 100° for 20 minutes. This antigen and human sera from cases of psittacosis and lymphogranuloma venereum fixed complement to the same extent as standard antigens from the homologous agents. The antibody in these sera reacting with these antigens could be completely removed by abortion agent. Sera from infected sheep fixed complement equally with psittacosis antigen and homologous antigen. Agent of enzootic abortion should be classified within the psittacosis-lymphogranuloma group.

A. W. G.

* **Virus of Enzootic Abortion in Ewes: Antigenic Relationship with Viruses of the Psittacosis Group.** Barwell, C. F., & Bishop, L. W. J. (1951.) *Nature.* **167.** 998 (3 refs.).

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expulsive efforts, presumably due to the vaginal trauma. On this and the two following days it was given morning and evening injections, each of 400,000 units of penicillin. Forty-eight hours after the operation it was turned out with the flock and from that time its behaviour was normal. Five weeks later the farmer reported that the ewe was doing well.

Acknowledgment.—Thanks are due to Mr. Colin Arthur, who brought this case to my notice while I was on holiday at his farm.

REVIEW

[**Gun Dogs : Training and Field Trials.** By P. R. A. Moxton. Popular Dogs Publishing Co., Ltd. Price 15s.]

The training of gun dogs is a fascinating subject, and in "Gun Dogs : Training and Field Trials," Mr. Moxton gives freely of his wide experience. There can be little doubt that he is now amongst the very few who can be accepted as authorities on this subject, but he makes no claim to have devised all the methods he describes, rather does he give credit to those who, although practised in the art, rarely record their views in print. Gradually, over many years a new school of thought has developed which has been responsible for the introduction of "gun dog training" as opposed to "gun dog breaking" ; to attempt to describe practical methods of dealing with animals is always a difficult task but the author's efforts are, on the whole, remarkably effective and he conveys a wealth of information to the reader. This book can be highly recommended to all those who have aspirations to train any variety of gun dog, especially the amateur who is considering participating in Field Trials. It is written in a pleasant style with numerous amusing anecdotes, and if certain facts are frequently repeated they are the very ones which the author wishes to impress firmly on the reader. As Mr. Moxton says, many trainers feel their final results would be much better if the owners of the dogs also underwent a period of training, and throughout the book one is constantly reminded that the author is attempting to train the owner how to train his dog. It is most refreshing to find a layman openly admitting that he is not writing a chapter on veterinary matters because he fully realises his lack of knowledge in this field, but it is perhaps a trifle contradictory that, in spite of this pronouncement, he condemns the practice of distemper immunisation, ignoring the overwhelming evidence in its favour. One would have thought that the usefulness of vaccination as a prophylactic measure was well recognised by most dog owners ; the author makes it quite clear that these are, of course, his own personal views, but it would be unfortunate if this opinion, expressed in a book which will no doubt be widely read, was to influence the outlook of dog owners on the present methods of controlling this disease. His confirmation of the effectiveness of the raw meat diet is particularly interesting when one considers the large numbers of working dogs fed chiefly on cereals and cooked meat. There can be little doubt that raw meat gives a working dog that extra stamina so essential for enduring a hard day's shooting. The book is made more valuable by the inclusion of useful appendices—these give full details of the Kennel Club regulations governing Field Trials, and also a comprehensive list of the Secretaries of the various Field Trial societies. The general arrangement of the subject matter is good, apart from one or two minor errors in printing, and the illustrations add considerable interest to the text.

This book should go a long way towards popularising the training of gun dogs, and if the author's technique is accepted and practised by shooting men one should see a much-needed improvement in the performance of dogs in the shooting field. Quite apart from Field Trials, there can be little doubt that a dog can make or mar a day's shooting, and although many of us, especially those interested in rough shooting, will perhaps never own a perfectly steady dog, it will not be for the want of a really good text-book on the subject.

NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY

ANNUAL GENERAL MEETING AT MANCHESTER

The annual general meeting of the National Veterinary Benevolent and Mutual Defence Society was held at the Midland Hotel, Manchester, on Tuesday, May 27th, 1952, with Mr. John Holroyd, President of the Society, as Chairman.

The minutes of the last annual general meeting were read and confirmed.

Mr. Holroyd opened the meeting by welcoming the members and briefly reviewed the work of the year to December 31st, 1951.

Hon. Treasurer's Report

Major F. Hopkin presented his report and accounts for the year and it was shown that the capital resources of the Defence Fund had increased by a further £3,000. The accounts of the Benevolent Fund revealed a very healthy position with income in excess of expenditure, and Major Hopkin again appealed for any deserving cases to be reported in order that the funds available may be utilised to the fullest extent.

After dealing with various questions the President said that in view of recent tendencies, the minimum which the Executive had set as a capital reserve must now be very greatly increased and all members of the profession would appreciate the force of this contention. On the proposition of Mr. H. M. Wilson, seconded by Mr. D. E. Leask, the Hon. Treasurer's accounts were received and adopted.

Hon. Secretary's Report

The Hon. Secretary's report was then submitted by Major Hopkin, and it revealed that the number of veterinary surgeons covered by the Defence Fund now exceeded 1,000. Twenty-nine claims had been received during the year and an analysis of these had been circulated to all members. Additionally, a list of some of the more important cases arising in the year ended December 31st, 1951, showing in summarised form the nature of the claims, had been circulated with the annual report and accounts, and would indicate to members of the profession the extensive range of claims which were being dealt with by the Society. The report contained a tribute to the valuable services rendered to the Society and the profession by the late H. W. Steele-Bodger. Other matters dealt with during the year had included a reference to discussions with the Inland Revenue on the allowability of subscriptions to the Society. It also recorded that a memorandum on Third Party Insurance had been circulated and reference was made to other matters dealt with during the year. As regards the Benevolent Fund, the report stated that grants totalling £830 had been made during the year and sincere thanks were expressed to those people and organisations who had made donations to the Benevolent Fund. The Hon. Secretary's report was received and adopted.

Tributes to Major Hopkin

The President referred to the work Major Hopkin had carried out for the Society and said that he had acted as Hon. Treasurer for about 35 years. Fifteen years ago Major Hopkin had accepted the office of Hon. Secretary in addition to his other duties, but it was clear that the time

had now come when the work of the two offices must be separated to relieve the burden of work carried by Major Hopkin. Mr. Holroyd found the opportunity to convey to Major Hopkin the sincere thanks of all members of the Society for the magnificent work he had carried out and which covered all phases of the Society's activities. The President was supported by Mr. H. SUMNER and Mr. J. K. BATEMAN, who also paid tributes to Major Hopkin's work.

APPOINTMENT OF OFFICERS

The following officers were appointed:—

President.—Mr. J. Holroyd.

Vice-Presidents.—Mr. H. Sumner and Mr. A. H. Watson.

Hon. Treasurer.—Major F. Hopkin.

Hon. Secretary.—Mr. Sumner, jun.

Assistant Secretary and Treasurer.—Mr. W. E. Johnson.

Auditors.—Messrs. Litton, Pownall, Blakey and Higson.

Council.—Mrs. E. H. Shaw, Miss Brancker, Messrs. J. Adamson, jun., F. Beckett, C. W. Cartwright, H. W. Dawes, O. V. Gunning, H. Holroyd, D. E. Leask, R. C. Locke, W. R. McKinna, J. W. Procter, R. F. Ross, C. F. Shawcross, W. K. Townson, A. J. Wright, H. M. Wilson and T. Wilson.

Other Business.—The proposed addition to the first paragraph of Rule 3 and the proposed addition to Rule 5, as circulated to members, were adopted on the proposition of Mr. H. SUMNER, seconded by Mr. H. M. WILSON. It was agreed that the summarised report of the Council Meeting be published in the supplement to *The Veterinary Record*; that the list of Benevolent Fund grantees as circulated in the annual report be published in *The Veterinary Record*. A vote of thanks was expressed to the B.V.A. for space provided in *The Veterinary Record* for reports of the Society's meetings and to the Royal College for the advertisement space provided for the Society in the *Register*.

ANIMAL HEALTH TRUST RESEARCH TRAINING SCHOLARSHIPS

As is now well known, an important function of the Animal Health Trust is to award research training scholarships or fellowships to young veterinary graduates who desire to take up a research or academic career and whose proven abilities make them suitable to do so. Two such research training scholarships tenable for periods not exceeding three years have just been awarded to Mr. N. G. Fowler, M.R.C.V.S., of Preston-by-Wingham, Kent, and Mr. Jack Marsh Payne, M.R.C.V.S., of Lutterworth, Rugby.

Mr. Fowler took his M.R.C.V.S. in 1951 at the Royal Veterinary College, obtaining first-class prizes in physiology, pathology and medicine. In the course of his academic career he also received the Helen Thompson Award and the Cecil Aldwin Award. His new research training scholarship from the Trust will enable him to study for the diploma of bacteriology and pursue veterinary bacteriological research at the London School of Hygiene and Tropical Medicine.

Mr. Payne has just taken his final M.R.C.V.S. at the Royal Veterinary College, winning his prizes in physiology, pathology and hygiene. Among his other academic distinctions have been the award of the R.V.C.M.A. Gold Medal, an Evans Final Year award (also made by the Animal Health Trust) and the Helen Thompson Award. As a result of his new research training scholarship he will be studying certain aspects of pathology at the University College Medical School, London.

UNIVERSITY OF LIVERPOOL—FACULTY OF VETERINARY SCIENCE

Examinations, June, 1952: List of Successful Candidates

Degree of M.V.Sc.

Mr. Kenneth James Hill, M.R.C.V.S., was admitted to the degree of Master of Veterinary Science (M.V.Sc.) of the University of Liverpool on July 5th, 1952.

Ordinary Degree of B.V.Sc.

As the result of the Final Examination, the following students were admitted to the Ordinary Degree of B.V.Sc. on July 5th, 1952:—

FINAL EXAMINATION:

Part I (Veterinary Medicine)

*Bailey, Elizabeth J.
*Benson, J. A.
*Booth, F. R.
*Bowen, D. E.
*Crowley, A. J.
*Davies, O.
*†Harding, J. D. J.
Medcalf, Rosemarie I., M.R.C.V.S.
*Morgan, T. D.
*Morris, J. E.
*Mortimer, P. H.
*Phillips, G. D.
*Pyke, B. N.
*Wilson, R.

* Admitted to Membership of the Royal College of Veterinary Surgeons on July 5th, 1952.

† With Distinction in Clinical Veterinary Medicine.

Other results announced are:—

Part II (Veterinary Surgery)
Adams, H. S.

THIRD EXAMINATION:

Part II (Veterinary Pathology)

Johnson, D. K.
Lloyd, M. K.
Neal, P. A.
Owen, A.
Parish, W. E.
Phillips, W. E. M.
Riley, E. D. D.
Riley, R. M.
Ritchie, H. E.
Robinson, Pamela F.
Todd, S. M.
Vickers, G. C.

Part III (Animal Husbandry and Genetics)

Ash, G. N.
Bett, T. F.
Cavill, J. P.
Farrer, J. S.
Hayes, B. W.
Rothwell, J.
Stallard, L. J.

SECOND EXAMINATION:

Part III (Animal Management)

Brown, J. K.
Freeman, A. P.
Llywelyn, G.
Sanders, G.
Wood, J.

FIRST EXAMINATION:

Part I (Chemistry)

Dickinson, L. G.
Fraser, C. E. O.
Fryer, J. C. C.
Lancaster, R.
Langman, B. A. G.
Sims, F. W.

Part II (Physics)

Birks, Margaret
Cowley, Margaret E.
Dickinson, L. G.
Doran, G. P.
Fraser, C. E. O.
Hughes, I. B.
Langman, B. A. G.
Sims. F. W.
Wortley, G. H.

Part III (Biology)

Birks, Margaret
Coles, B. H.
Crabb, P. J.
Dickinson, L. G.
Doran, G. P.
Dungworth, D. L.
Etheridge, M. F. N.
Evans, D. J.
Ewbank, R.
Fraser, C. E. O.
Gibbons, C. W.
Hughes, I. B.
Lancaster, R.
Langman, B. A. G.
Moss, B.
Murgatroyd, A. E.
Pickard, Barbara
Roberts, R. G
Schwarz, G.
Shepherd, M. J. W.
Sims, F. W.
Stuart, J. C.
Tyler, J.
Ward, R. K.
Watson, S. N.
Whiteley, H.
Wortley, G. H.

NOTES AND NEWS

Diary of Events

Sept. 3rd.—Joint Meeting of the South Eastern and Sussex Divisions, B.V.A., at the Wellcome Veterinary Research Station, Frant, Tunbridge Wells, 6 p.m.

Sept. 7th—13th.—Seventieth Annual General Meeting and Congress of the British Veterinary Association, at Harrogate.

Sept. 24th.—Meeting of the R.A.V.C. Division of the B.V.A. at the Equine Research Station of the Animal Health Trust, Newmarket, 11.15 a.m.

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B.V.A. Congress at Harrogate

Application for Tickets

Application forms for tickets required in connection with the forthcoming Congress of the Association to be held at Harrogate in September were issued with last week's number of *The Veterinary Record*. As indicated thereon, applications should be received by the General Secretary not later than August 18th.

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Congress Golf Competitions

Those wishing to enter the competition for the "Simpson" Trophy and the Ladies' Competition for the "Dunkin" Trophy are requested to notify Mr. J. O. Powley, M.R.C.V.S., 99, Station Parade, Harrogate, who is in charge of the arrangements.

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PERSONAL

Appointments.—The following appointments in the Colonial Veterinary Service are announced: Mr. J. E. Huddart, B.SC., M.R.C.V.S., and Mr. C. Walker, M.R.C.V.S., as Veterinary Officers, Kenya; Mr. P. G. Scoggins, M.R.C.V.S., as Assistant Veterinary Officer (temporary), Barbados.

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Mr. J. K. Hill's Degree of M.V.Sc.—As is intimated in the column recording the examination results of the Liverpool School of Veterinary Science, Mr. Kenneth James Hill, M.R.C.V.S., was admitted to the degree of Master of Veterinary Science (M.V.Sc.) of the University of Liverpool on July 5th, 1952.

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British Hurdles Record for David Gracie.—In our last issue we referred to the athletic prowess of David Gracie, student of University of Glasgow Veterinary School. Gracie added to his laurels in the British Games at the White City on Saturday last, as he achieved a British national record (52·7 seconds) in running second in the 440 yards hurdles to the phenomenal American hurdler C. Moore, whose time of 51·6 seconds was a world record.

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Births.—Blythman.—On August 8th, 1952, to Elspeth (*née* Wallace), wife of W. G. Blythman, B.SC., M.R.C.V.S., Newcastle-upon-Tyne, a son—Alistair Grant.

Gledhill.—On July 25th, 1952, to Joan and Graham Gledhill, of Ashton-under-Lyne, a son—John.

Grey.—On July 29th, 1952, to Lilian, wife of John R. Grey, M.R.C.V.S., a son.

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R.C.V.S. OBITUARY

Edgar, Alston, Major R.A.V.C. (retd.). Graduated London, December 16th, 1901. Died July 1st, 1952.

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GENERAL OBITUARY

Sir Jack Drummond, F.R.S.

A Tribute

His many friends in the veterinary profession will have read with horror of the tragic deaths of Sir Jack Drummond and his family while on holiday in France. His contributions to biochemistry were extensive and distinguished. Many workers of eminence in biochemistry owe their training and outlook to his stimulating teaching and guidance. Sir Jack's wide knowledge of his subject and its nutritional implications were largely responsible for the well-balanced policy of the Ministry of Food, of which he was Chief Scientific Adviser during the late war.

He had many friends within the veterinary profession, but it was on his appointment as Director of Research of Boots Pure Drug Co., Ltd., that he was able to give active encouragement to veterinary research. His support and enthusiasm were largely responsible for the enlargement and the equipping of the company's veterinary science division at Thurgarton. All the members of that division's staff will have vivid memories of his frequent visits, his interest, his curiosity and his friendliness to even the most junior of the staff. The writer will always be grateful for the guidance and support he received, and yet there was never any sense of interference in purely veterinary matters. Indeed he was "a merry gentleman" in the best sense of the words, and the veterinary profession has lost a sincere friend in Jack Drummond.

D. L. H.

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F.A.O. International Move Against Foot-and-Mouth Disease

Virus and Vaccine Stockpiles

In a recent announcement from Rome, to which reference was made in the Parliamentary columns of our last issue, the Food and Agriculture Organisation of the United Nations states that it will shortly convene a meeting of European countries to implement an international plan to end the current outbreak of foot-and-mouth disease in Western Europe and to deal rapidly with future outbreaks. The plan, evolved by the O.E.E.C. Working Party on Animal Diseases, the International Office of Epizootics and F.A.O.'s European Agriculture Committee, is essentially a mutual insurance system.

The announcement mentions that the principal viruses are types A, O and C, and that there is a further breakdown within types. It proceeds: "The current outbreak is mostly caused by one of the most virulent types, A-5. Type C, however, is also present. Type O has occurred only occasionally in the current outbreak. Nevertheless, to ensure complete safety every animal should be vaccinated with all three vaccines. Furthermore, since immunity brought about by vaccine wears off quickly, vaccinations should be given at least once a year. That this has not been done—thus permitting the spread of the disease—has been due to several factors. An important one is cost. One dose costs approximately $1·00, exclusive of veterinary charges. Since each animal requires at least three doses a year (one of each type of vaccine) the cost of immunisation of even a small herd is considerable.

"Hitherto, vaccines have been produced by infecting live cattle with foot-and-mouth virus through injections into the tongue. The amount of vaccine which can be obtained from each animal varies, but on the average it is about 300 doses. Production costs are very high. Special premises must be maintained for the infected animals; the animals must be fed during the incubation period; and, because such premises could be a focal point of infection, many special measures must be taken after they are slaughtered. The meat has to be specially treated, the bones burned or buried in lime, all blood and excrement disposed of, the pens and the slaughter shed thoroughly disinfected, and all persons who are in contact with the animals must also be decontaminated. (A recent outbreak in Canada was due to a human carrier.)

"In connection with its plan for collective control of foot-and-mouth disease in Western Europe, F.A.O. will suggest, to countries participating in the forthcoming meeting, the adoption of a new, inexpensive method of vaccine production. This method of virus cultivation, devised by Dr. H. S. Frenkel, of the Netherlands, does away with the need for a group of live animals to act as hosts for the virus. Dr. Frenkel's method, recently proved successful in carefully controlled tests carried out by Dr. Ian Galloway, of the United Kingdom, utilises the tongues of freshly slaughtered healthy animals as a culture for development of the virus. F.A.O. estimates that it could save as much as 90 per cent. of production costs.

"F.A.O. is advocating that stores of the three types of foot-and-mouth virus be maintained in all countries which are able to manufacture vaccine. The virus can probably be kept indefinitely and these stores would form a permanent reserve to meet outbreaks. Indeed, this lasting quality is one of the reasons why foot-and-mouth disease is so particularly insidious a danger. An outbreak, carried by men, birds, or by meat from infected animals, can occur thousands of miles away from the initial centre of infection just because the virus is so resistant.

"The vaccine, on the other hand, cannot be kept indefinitely. Yet there must also be a permanent reserve of it, too, since it takes three weeks to convert the virus into a vaccine and to carry out the necessary tests before sending it into the field. The F.A.O. plan, therefore, advocates storage of sufficient vaccine in one or more countries to meet the threat of an outbreak in any country in Western Europe. It is obvious that this kind of mutual insurance system would considerably lower the defence cost for single participating countries.

"The fight against the disease is not only the concern of the country where it strikes. All countries are endangered by its presence in any country. It spreads rapidly and easily, regardless of national frontiers. It is, of course, possible to free a country from the disease by slaughtering infected cattle and destroying the carcases, as is done in various countries, for example, the United States, the United Kingdom, Norway and Switzerland. If the slaughter method could be carried out in all countries the disease would eventually be eradicated. But comparatively few countries, where the disease is enzootic, can afford the financial burden of such a policy. This being so, the answer is vaccination of the animals in these countries in a large area surrounding the outbreak area, in order, by immunisation, to stop the spread of the disease. This, the only economically feasible solution, presents a clear case for the international co-operation advocated by F.A.O.

"Even when the present outbreak dies down it will be necessary to keep stores of virus and vaccines, and to maintain administrative machinery for their use. Foot-and-mouth disease in countries where it is endemic has a way of flaring up periodically after a few years of quiescence. Western Europe cannot afford to lose $400,000,000 or more every few years to a controllable virus disease."

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Foot-and-Mouth Disease in England and Scotland

Controlled Area Restrictions Withdrawn

The Ministry of Agriculture has announced that all the Controlled Area restrictions in England and Scotland will be withdrawn. The restrictions in the infected areas in Kent, Cumberland, Northumberland, Dumfriesshire and Kirkcudbright remain in operation.

In view of the general improvement in the foot-and-mouth disease situation authority has been given for resumption of the exhibition of livestock at agricultural shows outside infected areas.

Numbers of outbreaks have been declining in recent weeks, and the July total of 51 was less than half that of June. There have been only 11 notifications since July 25th, and there is evidence that sources of possible reinfection on the northern Continental coast are diminishing.

Since outbreaks began on November 14th last there have been 555 notifications in Britain. They have resulted in the slaughter of 33,487 cattle, 29,483 sheep, 11,565 pigs, and 57 goats. Compensation processes have not been finished in 10 of the recent cases, but others entailed payment of £2,618,213—a sum described by the Minister of Agriculture as "by far the largest payable in compensation for any comparable period in the history of the disease in this country." The Minister attributed its proportions to the high money value of the stock affected.

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Sir Ernest Gowers

Sir Ernest Arthur Gowers, who is to preside over the Committee of Enquiry into methods for the control of foot-and-mouth disease, is (says *The Farmers' Weekly*) a classical scholar and a civil servant with a long and versatile experience in the conduct of public enquiries.

"He has been Chairman of committees or commissions looking into such matters as capital punishment, the reorganisation of the coal mines, the working of the Shops Acts, the preservation of historic houses, the welfare and safety of people employed in non-industrial work, and the admission of women to the foreign service.

"But he is best known for his book, *Plain Words*, a guide to the civil service in the use of English. Sir Ernest, like farmers has no time for officialese and believes in calling a spade a spade rather than a hand-operated digging unit. At least the report on the foot-and-mouth enquiry, with all its complexities, should be in plain language and make fair reading."

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"Prima Facie Case Against Birds"

Birds are blamed for outbreaks of foot-and-mouth disease in Britain by authors of an article in the current issue of *Agriculture*, journal of the Ministry of Agriculture. (Stationery Office, 9d.) The article will be dealt with at greater length in a later issue of the *Record*.

After reviewing the course of the disease in recent years, Mr. W. W. Wilson, M.R.C.V.S., and Mr. R. C. Matheson, M.R.C.V.S., two members of the Ministry's veterinary staff, state: "The seasonal incidence and location of primary outbreaks in the east and south coastal counties of this country shows a striking parallel to the period of autumn migration of birds and their area of landfall. We conclude that available evidence is adequate to establish a *prima facie* case against birds, and especially starlings on migration, as a means whereby foot-and-mouth disease is introduced into Britain; further, that the frequency of its introduction is dependent on the extent of the disease in certain coastal areas of the low countries and north-east France at the season of bird migration."

The writers point out that many of the outbreaks of the disease in the spring and summer of 1952 occurred in the southern coastal counties of England. At the same time there had been in the northern coastal counties of France an increase in infection unprecedented in extent for the time of the year.

"The evidence suggests that in 1952 for the first time the spring migration may have been responsible for introducing infection into this country. Moreover, the continuance of further cases in the coastal counties throughout the summer, while the intensity of infection in northern France was still increasing, raises the question whether in certain circumstances it is not possible for infection to be carried by cross-Channel movements of birds which are not part of the regular migratory movements."

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Re-stocking of Farms

Re-stocking of farms hit by foot-and-mouth disease, a process now being undertaken in one of the most important dairying areas in the kingdom—Cheshire, North Shropshire and North Staffordshire—has (says *The Farmers' Weekly*) been accompanied by a marked swing towards attestation.

"In Cheshire, for instance, of the 90 farmers who had their herds destroyed, one-third at that time held a T.T. licence. Now two-thirds have qualified for a licence and the proportion will increase further."

The Farming News reports that the effects of the outbreaks of foot-and-mouth disease both as regards re-stocking and interruptions that had taken place in the various services to members were discussed recently by the Council of the British Friesian Cattle Society. Suggestions had been made that it would be necessary to look abroad for attested cattle to re-stock certain herds, but the Council had information in its possession which made it clear that there were sufficient cattle in Britain to re-stock herds which had suffered grievous loss.

Although the Council recognised the fact that the various stand-still orders and limitations had inflicted hardships on individual breeders whose animals had not received a sufficient number of tests in some lactations to allow the animals to qualify for the various registers and grading-up, etc., it was agreed not to reduce the standards already laid down with regard to the minimum number of butter-fat tests acceptable to qualify for this register.

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DECLARATION OF TWO TUBERCULOSIS ERADICATION AREAS

On Monday last the Ministry of Agriculture announced the declaration of two Tuberculosis Eradication Areas in South-West Wales and South-West Scotland respectively and the making of an Order amending the Tuberculosis (Area Eradication) Order, 1950.

Notice was given at the end of September, 1950, of intention to declare as Tuberculosis Eradication Areas on October 1st, 1952, two large areas, namely:—

(*a*) The counties of Cardigan and Carmarthen (except the Brecon Mountain district) and part of the county of Pembroke; and

(*b*) The counties of Ayr, Dumfries, Kirkcudbright, Renfrew and Wigtown, and parts of the counties of Argyll and Bute.

Since October 1st, 1950, free tuberculin tests have been provided in the two Areas, and most of the herds that were not then attested have since qualified for entry to the voluntary Tuberculosis (Attested Herds) Scheme and for bonus payments. Only a few owners have not begun to clean up their herds or have so far failed to qualify for entry to the Scheme.

Under the Tuberculosis (South-West Wales Eradication Area) Order, 1952, and the Tuberculosis (South-West Scotland Eradication Area) Order, 1952, which come into operation on October 1st, 1952, these areas are declared to be Tuberculosis Eradication Areas.

These two Areas will then become subject to the provisions of the Tuberculosis (Area Eradication) Order, 1950. That Order provides that no cattle shall be moved into an Eradication Area or Attested Area except on certain transit journeys or under the authority of a licence issued by a veterinary inspector or other officer of the Ministry or of a permit issued under the Tuberculosis (Attested Herds) Scheme, 1950; that a notice may be served on the occupier of any premises in such an Area prohibiting the movement of cattle on to or off the premises except under licence; and contains other provisions designed to prevent the introduction or spreading of tuberculosis.

From October 1st all herds in the two Areas will be tested, and any reactors found will be slaughtered with payment of compensation on the basis of the market value of the animal as an untested animal. When disease has been eradicated from the two Areas they will be declared Attested Areas and will share this distinction with the three Areas (the county of Zetland, the Isles of Scilly and the islands of Arran and Great and Little Cumbrae in the county of Bute) that were declared Attested Areas on February 1st, 1951.

At the same time the Minister has made the Tuberculosis (Area Eradication) Amendment Order, 1952 (S.I. 1952 No. 1473), which effects a minor amendment to the 1950 Order. It comes into operation on October 1st, 1952. The Orders relating to the importation of cattle from Ireland, the Isle of Man, the Channel Islands and Canada provide for the licensing of cattle from landing places to farm premises and to authorised markets and from authorised markets to farm premises. The effect of the new Order is that a licence under the Tuberculosis (Area Eradication) Order, 1950, will not be needed for the movement of cattle which are moved on a licence granted under the appropriate import Order to premises in an Eradication Area or Attested Area from a landing place, or from an authorised market situated in such an Area. Such animals must be kept in isolation at the premises to which they are moved pending a 60-day tuberculin test. The conditions under which licences under the import Order will be granted for the movement of cattle into Eradication Areas and Attested Areas are explained in the memorandum referred to below.

Copies of the three Orders may be purchased directly, price 2d. each, from H.M. Stationery Office at the following addresses: York House, Kingsway, London, W.C.2; 429, Oxford Street, London, W.1; 13a, Castle Street, Edinburgh, 2; 39, King Street, Manchester, 2; 2, Edmund Street, Birmingham, 3; 1, St. Andrew's Crescent, Cardiff; and Tower Lane, Bristol, 1; or by post (3½d.) from P.O. Box No. 569, London, S.E.1.

Copies of a memorandum explaining how the provisions of the 1950 Order relating to the movement of cattle into and within Tuberculosis Eradication Areas and Attested Areas will be applied may be obtained on application to the Secretary, Ministry of Agriculture and Fisheries, Animal Health Division, Hook Rise, Tolworth, Surbiton, Surrey, or 15, Moray Place, Edinburgh, 3.

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Tuberculosis (Attested Herds) Scheme, 1950

STATEMENT SHOWING POSITION IN EACH COUNTY AS AT JUNE 30TH, 1952

County	Total Cattle as at 4.6.51	Number of Attested Herds as at 30.6.52	Number of Cattle in Attested Herds as at 30.6.52	Percentage of Attested Cattle to Total Cattle
Bedford	48,981	200	12,780	24·7
Berkshire	92,131	794	50,450	54·6
Buckingham	121,185	655	37,360	30·8
Cambridge	34,108	176	10,830	31·8
Isle of Ely	23,332	34	1,970	8·4
Chester	251,247	1,311	66,580	26·5
Cornwall	275,418	1,620	54,950	20·0
Isles of Scilly	516	89	516	100·0
Cumberland	226,769	3,050	140,980	62·2
Derby	191,445	720	36,330	19·0
Devon	411,624	1,630	101,320	24·6
Dorset	159,110	1,263	74,020	46·9
Durham	119,258	1,071	38,270	32·0
Essex	131,656	900	51,410	39·0
Gloucester	203,382	1,268	69,650	34·2
Hampshire	156,926	1,351	76,430	48·7
Isle of Wight	21,888	256	10,520	48·1
Hereford	139,533	918	37,320	26·7
Hertford	64,182	473	29,450	45·9
Huntingdon	31,605	61	4,330	13·7
Kent	127,175	823	42,010	32·0
Lancaster	281,010	2,020	80,020	28·5
Leicester	174,334	484	27,330	15·7
Lincoln (Holland)	30,853	22	1,000	3·2
Lincoln (Kesteven)	75,212	188	9,610	12·8
Lincoln (Lindsey)	173,869	325	16,590	9·5
London	—	—	—	—
Middlesex	8,210	54	2,780	33·9
Norfolk	206,585	757	57,390	27·8
Northampton	162,475	319	22,190	13·1
Soke of Peterborough	7,363			
Northumberland	202,748	654	37,590	18·5
Nottingham	116,515	352	17,910	15·4
Oxford	113,873	819	47,860	42·0
Rutland	21,485	24	1,020	4·8
Salop	280,257	1,276	69,880	24·9
Somerset	329,401	2,464	123,460	37·5
Stafford	240,728	736	36,390	15·1
Suffolk, East	86,629	491	24,580	28·4
Suffolk, West	43,338	266	17,300	39·9
Surrey	54,412	617	28,180	51·8
Sussex, East	110,983	796	37,920	34·2
Sussex, West	79,150	660	38,470	48·6
Warwick	156,792	603	34,730	22·2
Westmorland	97,030	1,880	77,520	79·9
Wiltshire	209,483	1,095	83,730	40·0
Worcester	105,750	406	21,460	20·3
York, E. Riding	143,974	215	10,360	7·2
York, N. Riding	256,784	1,813	64,090	25·0
York, W. Riding	350,578	2,452	91,510	26·1
ENGLAND	6,951,495	41,448	2,028,176	29·2
Anglesey	53,179	699	16,060	30·2
Brecon	47,390	951	25,140	53·0
Caernarvon	58,789	1,481	29,680	50·5
Cardigan	77,779	4,292	76,270	98·1
Carmarthen	138,207	6,190	120,030	86·8
Denbigh	100,169	1,342	39,850	39·8
Flint	61,370	364	14,460	23·6
Glamorgan	75,332	926	21,170	28·1
Merioneth	40,369	1,602	31,830	78·8
Monmouth	71,107	477	18,090	25·4
Montgomery	96,991	2,231	56,250	58·0
Pembroke	103,234	2,952	69,280	67·1
Radnor	37,212	415	10,890	29·3
WALES	961,128	23,922	529,000	55·0
ENGLAND AND WALES	7,912,623	65,370	2,557,176	32·3
Aberdeen	227,510	464	35,850	15·8
Angus	65,612	220	20,450	31·2
Argyll	62,947	1,338	37,710	59·9
Ayr	153,587	2,301	143,030	93·1
Banff	56,110	122	7,930	14·1
Berwick	34,902	130	9,020	25·8
Bute :				
Attested Area	6,036	236	6,036	100·0
Non-Attested Area	5,093	92	5,063	99·2
Caithness	28,441	207	5,740	20·2
Clackmannan	4,523	41	2,940	65·0
Dumfries	105,935	1,867	93,100	87·9
Dunbarton	17,440	309	15,200	87·2
East Lothian	16,435	79	5,960	36·2
Fife	64,362	552	38,480	59·8
Inverness	52,918	923	14,710	27·8
Kincardine	40,169	101	8,070	20·1
Kinross	9,753	71	4,910	50·3
Kirkcudbright	75,789	1,107	67,550	89·1
Lanark	94,703	1,566	81,670	86·2
Midlothian	24,535	290	14,460	58·9
Moray	30,581	103	8,170	26·7
Nairn	8,989	48	2,670	29·7
Orkney	49,597	556	13,040	26·3
Peebles	11,676	251	9,190	78·7
Perth	91,725	499	29,550	32·2
Renfrew	30,173	532	26,500	87·8
Ross-shire	39,929	1,044	11,270	28·2
Roxburgh	35,669	199	10,040	28·1
Selkirk	6,141	98	2,950	48·0
Stirling	41,213	601	27,380	66·4
Sutherland	9,851	675	5,130	52·1
West Lothian	15,088	218	10,340	65·9
Wigtown	74,642	849	66,900	89·7
Zetland	7,453	1,806	7,453	100·0
SCOTLAND	1,600,127	19,495	848,462	53·0
GREAT BRITAIN	9,512,750	84,865	3,405,638	35·8

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DOG TOURNAMENT IN AID OF THE ANIMAL HEALTH TRUST

The Star Dog Tournament referred to recently in our columns took place, as arranged, at the White City, and was a great success. Among those present were the President and both Vice-Presidents of the British Veterinary Association, members of the Committee of the Kennel Club, representatives of the National Farmers' Union, the Managing Director of *The Star* newspaper, and, representing the Trust, Mr. J. Arthur Rank, Chairman of the Executive Committee, Lord Stamp and Dr. W. R. Wooldridge, M.SC., M.R.C.V.S., F.R.I.C. Mr. S. F. J. Hodgman, M.R.C.V.S., Scientific Director of the Trust's Canine Research Station, acted as Superintendent Veterinary Surgeon to the Tournament.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Berks.—Hillside, Church Lane, Arborfield (Aug. 1st); Kentwood Farm, Cholsey, Wallingford (Aug. 2nd).

Cheshire.—Hollywell Farm, Faddiley, Nantwich (Aug. 4th).

Devonshire.—Stretchney Farm, North Huish, South Brent (Aug. 1st).

Essex.—Aerodrome Piggeries, Great Sampford, Saffron Walden (Aug. 1st); Park Field, Stonnard's Hill, Theydon Grove, Epping (Aug. 4th); Peakin's Farm, High Easter, Chelmsford; Till's Farm, Boxford, Colchester (Aug. 5th); Moor Hall, Little Bardfield, Nr. Braintree (Aug. 6th).

Glos.—Rangeworthy Court, Rangeworthy, Nr. Bristol; Ivy Farm, Breadstone, Berkeley (Aug. 4th).

Kent.—Bolebroke Beagles, Kennels, Crowdleham, Kemsing, Sevenoaks, Kent (Carcase at Messrs. Burroughs Wellcome & Co., *Postmortem* Room, Langley Court, Beckenham, Kent) (Aug. 9th).

Leics.—Keeper's Lodge, Beaumont Leys, Leicester (Aug. 4th).

Lincolnshire (Lindsey).—Northope Dairy Farm, Ashby, and The Glebe Field, Old Bolingbroke, Spilsby (Aug. 7th).

Norfolk.—Broadmoor Farm, Carbrook, Thetford (Aug. 5th); Uphall, Ashill, Thetford (Aug. 6th); Shotesham Buildings, Shotesham All Saints, Norwich, Norfolk (Aug. 9th).

Oxon.—Cooper's Field, Sonning Common (Aug. 4th).

Somersetshire.—Walnut Tree Farm, Axbridge (Aug. 2nd); Gotton Farm, West Monkton, Taunton (Aug. 6th).

Southants.—New Lodge Farm, Over Wallop, Stockbridge (Aug. 7th).

Suffolk (W.).—Barnardiston Hall, Haverhill (Aug. 1st).

Sussex (East).—Castle Hill Farm, Rotherfield, Tunbridge Wells (Aug. 9th).

Wilts.—Manor Farm, Rowde, Devizes (Aug. 1st); Muddiford Buildings, Redlynch, Downton, Salisbury (Aug. 7th).

Yorks (N.R.).—Greyhound Inn, Bagby, Thirsk (Aug. 5th).

FOOT-AND-MOUTH DISEASE:

Cumberland.—Monkhill Mill, Burgh-by-Sands, Carlisle (Aug. 1st); Cummersdale Grange, Carlisle (Aug. 3rd); Mill House Buildings, Linstock, Carlisle (Aug. 4th); Low Town Farm, Upper Denton (Aug. 5th).

Dumfriesshire.—Taylorland, Brownrigg Loaning, Dumfries (Aug. 2nd); Brownrigg, Lockerbie Road, Dumfries (Aug. 8th).

Kent.—Parsonage Barn Land, Ashford (Aug. 4th).

SWINE FEVER:

Derbys.—Highfield Allotments, Chesterfield (Aug. 2nd).

Essex.—Roydon Lea Farm, Ware (Aug. 7th).

Fife.—Kirton Dairy, Burntisland (Aug. 8th).

Lincs.—Monksthorpe, Spilsby (Aug. 7th).

Lincs (Lindsey).—George Avenue Allotments, Skegness (Aug. 4th).

Midlothian.—"Summerlea," Gylenium Road, Edinburgh (Aug. 4th); 12 Holding, Letham, Mid-Calder (Aug. 4th).

Warwicks.—Burton Green Stores, Nr. Kenilworth (Aug. 6th).

Yorks.—39, Hobson Avenue, Penistone Road, Sheffield (Aug. 4th).

FOWL PEST:

Isle of Ely.—14, Newgate Street, Doddington, March; 9, Church Lane, Doddington, March, Cambs (Aug. 8th).

Warwicks.—Yew Tree Farm, Earlswood, Birmingham (Aug. 6th).

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LEGAL NOTES

WOMAN FINED FOR ILLEGAL PRACTICE

At Portsmouth Magistrates' Court, on July 22nd, Edith Ellen Wagstaff, of 2, Brecon Avenue, East Cosham, was fined £2 2s. with £4 7s. costs. She had pleaded not guilty to practising veterinary surgery when not registered, on February 24th.

Mr. G. A. MacDonald (prosecuting) said that an undertaking not to practise had been signed by defendant, who was not registered in 1950.

Winifred Betty Dixon, of 19, Carmarthen Avenue, East Cosham, said that in February her dog was unwell. Defendant came to the house, examined the dog and prescribed treatment. Miss Wagstaff was paid 5s. The dog recovered and was quite well for six or seven weeks, but was taken ill again, and Mr. Powell, a veterinary practitioner, was called in.

Cross-examined by Mr. A. A. Grubb (defending) Miss Dixon said they were satisfied with what Miss Wagstaff had done and her father later thanked her.

Mr. T. W. J. Powell said he examined the dog, which was very ill, on April 8th, and diagnosed that it was suffering from hard pad. He gave it injections of serum and eventually it recovered.

On oath, Miss Wagstaff said she boarded dogs, did general conditioning, and preparation for shows.

A veterinary surgeon attended the house practically every day. On February 24th Mr. Dixon, who was very agitated, called on her about his dog. She rang the veterinary surgeon, who was not in, however, and then went to Mr. Dixon's home.

She found and removed a small splinter of wood from underneath its tail. The dog, which had been vicious, became much quieter. She admitted she made a charge of 7s. 6d., but said that she only "went in an emergency."

Mr. Grubb submitted the Act permitted certain operations to be carried out by unqualified persons. One was the rendering in an emergency of first aid for the purpose of saving life or relieving pain. He contended the prescribing of the medicine was part and parcel of the operation of removing the splinter.

ONDERSTEPOORT SENIOR RESEARCH FELLOWSHIPS

From funds which have been made available by the Meat, Wool and Dairy Control Boards it has been decided to establish up to five senior research fellowships tenable at Onderstepoort for research into a variety of conditions of importance to the production of the products under the control of these Boards. Accordingly, applications are invited from suitably qualified candidates for appointment to the following fellowships:—

(*a*) One research fellowship for the study of the endo- and ecto-parasites of animals, with particular reference to sheep. This will include a study of their rôle as vectors of disease and methods for their control.

(*b*) One research fellowship in bacteriology (aerobic and anaerobic) including all aspects of the bacteriology of ruminal digestion.

(*c*) Two research fellowships into diseases caused by viruses and rickettsias, with particular reference to cultivation and preservation, together with the study of immunity and immunity production.

(*d*) One research fellowship into the physiology of reproduction, particularly of cattle and sheep, and including problems connected with the practice of artificial insemination.

The scope of the individual fellowships is indicated in the broadest terms and may not be strictly adhered to. Applicants are invited to indicate the scope of the research project contemplated. Previous experience in the particular or related field will be a recommendation.

CONDITIONS

(*a*) The fixed salary will not be less than £1,500 per annum plus cost of living allowance (at present £100 per annum for single officers and £320 for married officers), depending upon previous experience and suitability of the applicant for the post.

(*b*) Free first-class passage by sea, rail and/or air for the appointees and their families to Pretoria will be provided. This will include similar return passage on termination of the contract.

(*c*) Appointees will work under the direction of the Director of Veterinary Services and in all relevant matters will be subject to regulations applying to the Union Civil Service.

(*d*) Appointment in the first instance will be for a period of three years with the possibility of reappointment for a further period of two years. The first year from the date of embarkation will be regarded as probationary. Thereafter the contract may be terminated by three months' notice on either side.

(*e*) Further particulars may be obtained from the Director of Veterinary Services, Onderstepoort Laboratories, P.O. Onderstepoort, Transvaal, South Africa.

(*f*) Applications, giving full particulars of age, marital state, qualifications, experience, publications, date of assuming duty, with copies of two recent testimonials from persons prepared to act as referee, and any relevant information, should be addressed to the Director of Veterinary Services to reach him at the above address by August 30th, 1952. Alternatively, applications should be addressed to the Secretary, High Commissioner for the Union of South Africa, South Africa House, Trafalgar Square, London, England, to reach him by the same date. Personal interviews with the Director of Veterinary Services may be arranged at South Africa House, London, during the period September 3rd to 17th.

(*g*) Prior to appointment submission of a satisfactory medical certificate and proof of age will be required.

(*h*) Appointment will be limited to candidates of European descent acceptable for immigration to the Union of South Africa.

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Whipsnade Zoological Park

We reproduce below, by courtesy of the author and of the editors of *Nature*, the article contributed to the May 24th issue of that journal by Dr. L. HARRISON MATTHEWS, Scientific Director of the Zoological Society of London.

This year Whipsnade Zoological Park celebrates its coming of age. In less than a generation the Zoological Society of London has transformed a derelict Bedfordshire estate into one of the most famous zoological parks in the world, and the name of Whipsnade has become a household word. In addition to Whipsnade's achievements in the field of zoological science, it has become recognized as a national institution where more than half a million visitors find interest, relaxation and entertainment every year.

The Park occupies an area of more than 500 acres on the northern slopes of the Dunstable Downs, marked by the gigantic figure of a lion cut through the turf into the white chalk. The landscape is well varied, consisting of woodland, meadow and downland, and provides an ideal setting for the display of animals in natural surroundings. The estate is served by several miles of metalled roads and innumerable tracks and paths; recently a road train has been installed to carry visitors to the main points of interest.

The range of animals now shown at Whipsnade is larger than ever before. Lions and tigers inhabit natural pits on the northern

slopes of the downs; alongside them are the polar bears in an enclosure resembling as nearly as possible their Arctic home. In the woods near Whipsnade Gate are found pumas, cheetahs, dingos and a troop of rhesus monkeys. In Wolf Wood a spruce plantation provides a fitting background for the wolves, which are perhaps seen to best advantage after a fall of snow. A fine herd of bison occupies one of the large paddocks on the northern slopes and does well in the open in all weathers. More surprising, perhaps, are the hippopotamus, which are acclimatised to live in the open all the year round, making use of only an open shelter with some artificial heat in the most severe weather. One of the most spectacular exhibits of the Park is the Kodiak bears, the largest race of the grizzly. The male Indian rhinoceros is remarkably docile, and may perhaps breed with the young female which the Society has recently acquired and hopes shortly to import from Assam. Some of the most charming features of the Park are the large numbers of wallabies and some of the smaller species of deer that run wild over the estate.

Although less spectacular than the mammals, the birds at Whipsnade also make a fascinating display. Nearly every paddock has its quota of rheas, ostriches, cranes or exotic geese. Peafowl wander at liberty and display themselves proudly on the lawns, while the flamingo pond by the main restaurant is one of the most beautiful sights in the Park. The British wild birds have their own natural sanctuary, and many species breed there every year.

Whipsnade owes its origin to the vision and energy of the late Sir Peter Chalmers Mitchell, for many years secretary of the Society. He thought of it first as a home for reserve stock and also as a kind of "holiday camp" for the animals in the Society's collection at Regent's Park, London. The fact that Whipsnade has now become much more than this and is now a zoological park in its own right only endorses the excellence of his views.

When first purchased, the estate consisted of semi-derelict farmland and was unfenced. The first move in establishing the Park was to surround the whole area with a wire fence 9 ft. high and 4½ miles long. This fence was originally fitted with an overhanging section facing inwards to prevent the escape of animals; but it had later to be turned outwards, for it was found to be more important to keep foxes out than the animals in. Roads were made, paddocks laid out, and the old farm buildings were converted into a restaurant. The thickets and undergrowth were cleared, and the planting of natural panoramic backgrounds, which are now such a feature of the main paddocks, was begun. Shelters were put up and the paddocks fenced off and the nucleus of the collection was installed.

The first day of Whipsnade's life was eventful and dramatic. The Society's most optimistic hopes were not only realized but exceeded—so much so, in fact, that the situation very nearly degenerated into chaos. The roads leading to the Park were inadequate to deal with the volume of traffic they were called upon to carry, for everyone had failed to foresee Whipsnade's immense popularity. As a result, every approach to the Park was blocked with motor-cars, and the Bedford Constabulary had to be turned out in force to deal with the situation. At the Park itself the turnstiles were overwhelmed by the avalanche of visitors, and the catering staff found themselves totally unable to cope with the surging crowds clamouring for refreshments. All these early troubles have long since been corrected; a new road has been constructed and old roads widened so that a visit to Whipsnade is easily and comfortably made.

The early popularity of Whipsnade was more than maintained in the years before the Second World War, and in 1937 there was a record entry of some half a million visitors. Dr. Julian Huxley, who followed Sir Peter Chalmers Mitchell as the Society's secretary from 1935 until 1942, was particularly interested in Whipsnade, and it is to his initiative that the Park owes the Gibbon Island and the picturesque Flamingo Pond by the Hall Farm Restaurant. At the outbreak of war in 1939, Whipsnade became an evacuation centre for many of the animals from the London Zoo, including the Indian riding elephants and the giant panda.

In the winter of 1939-40 the Park was closed, but it was reopened the following spring and has never been closed since. Even in 1941, at the height of war-time misfortunes, the attendance figures reached nearly a quarter of a million. As part of the war-time drive for food, 160 acres which had formerly been farmland were put back under cultivation, and to economise in animal feeding stuffs much valuable stock had to be destroyed. One unexpected problem which the Society had to solve during the War was the camouflaging of the white lion carved in the chalk of the Dunstable Downs: it had to be hastily covered with earth and brushwood. As its outline measures more than three-quarters of a mile in length, this was by no means a simple task, and the lion's subsequent resurrection after the War took several weeks.

Although restrictions since the War have necessarily limited the building of new shelters and houses, a few simple modifications to the paddocks have greatly improved the visitor's view of the animals. Several of the boundary fences have been replaced by low barriers and dykes of the ha-ha type, so that visitors no longer have their vision impeded by wire netting. This device makes possible the illusion that one is actually walking in the same enclosure as the animals and has gone a long way to realise the ideal of a "zoo without bars" which Whipsnade's originators hoped it would one day become.

Whipsnade has recently acquired several interesting additions, including leopards, penguins and sea lions; giraffes have been bred and reared for two years in succession. There are magnificent herds of eland, zebra, and many other species of the larger ruminants, and a small group of the interesting Ankole cattle which have recently been successfully bred. An enclosure has now been constructed around an old oak tree in which a colony of pandas has been established.

An important part of Whipsnade that is not seen by the ordinary visitor are the breeding pens for waterfowl and exotic pheasants, where a most interesting collection of birds is kept in a secluded fold of the hills and many species are successfully bred, much to the profit of the Society. Two years ago a stoat broke into these enclosures one night and did much damage.

New animals arrive at Whipsnade nearly every week, and as soon as conditions permit it is hoped that the Park's amenities may be still further improved. Projects that the Society is particularly anxious to carry out are the building of a new chimpanzee house, a still larger enclosure for the polar bears with a really deep pool, and an elephant lawn. At the moment, of course, these projects must remain only plans; but undoubtedly after the achievements of the past 21 years, Whipsnade can celebrate its coming of age with every confidence in the future.

The opportunities for scientific work, particularly on the behaviour of animals, are very great at Whipsnade. These opportunities have as yet scarcely been made use of; but it is hoped that before long they will be fully exploited and the Society will be able to present results of considerable scientific interest and importance.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

THAT SLANG TERM "VET."

Sir,—Not until I read the correspondence in *The Veterinary Record* on this subject had it ever occurred to me that when addressed as such the contracted title conveyed with it the speaker's or the writer's contempt, such as your correspondent W. M. Scott would have us believe. Let this same correspondent, and any others, take pride in the fact that some members alive to-day rejoiced in the name of "farrier"!—Yours faithfully, R. J. A. Swift, 12, Severn Street, Welshpool. *August 10th*, 1952.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange	Sheep Scab	Swine Fever
1st to 15th July, 1952	36	29	5	—	—	22
Corresponding period in—						
1951	7	3	22	—	—	32
1950	9	—	9	—	—	13
1949	6	—	34	—	—	—
1st Jan. to 15th July, 1952	310	437	126	—	1	579
Corresponding period in—						
1951	267	21	516	—	4	510
1950	220	14	96	—	19	35
1949	106	11	319	—	28	5

Tuberculosis Order of 1938

The number of bovine animals slaughtered under the Tuberculosis Order of 1938 during the period April 1st to June 30th, 1952, was 745.